

Low Coherence Wavefront Probe for Nanometer Level Free-Form Metrology, Phase II

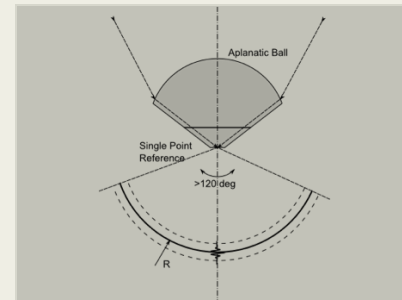
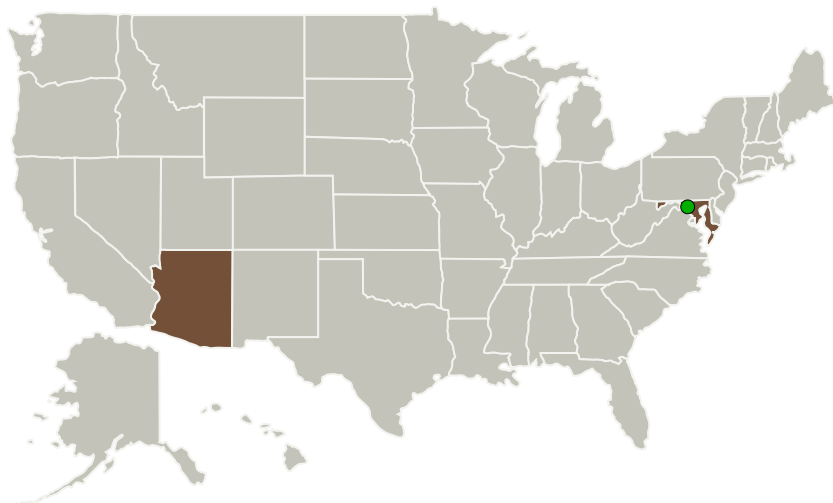
Completed Technology Project (2017 - 2018)



Project Introduction

We propose an innovative, low coherence probe for rapid measurement of free-form optical surfaces based on a novel method of spectrally controlled interferometry. The key innovations are the use of a new interferometric modality and a novel non-contact optical probe that together measure high surface slope acceptance angles to nanometer sensitivity. When the probe is integrated with a precision motion, x, y, & z metrology frame, it will meet NASA's need to measure free-form optical surfaces from 0.5 cm to 6 cm diameter ranging from F/2 to F/20, including slopes up to 20 degrees (with potential for 60 degrees), with an uncertainty targeted at 2 nm RMS. The probe operation does not require tilting to measure slopes. This results in this simplified cartesian metrology frame, also critical to achieve 2 nanometer measurement uncertainty. These features: nanometer resolution and 20 degree slope acceptance angle, have up to this time not been found in a single probe or sensor, non-contact or contact. This Phase II proposal takes the probe and its innovative spectrally controlled light source into a production prototype level capable of meeting NASA metrology goals.

Primary U.S. Work Locations and Key Partners



Low Coherence Wavefront Probe for Nanometer Level Free-Form Metrology, Phase II Briefing Chart Image

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Organizations Performing Work	Role	Type	Location
Apri Instruments, LLC	Lead Organization	Industry	Tucson, Arizona
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Arizona	Maryland

Project Transitions

April 2017: Project Start

December 2018: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140899>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Apri Instruments, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

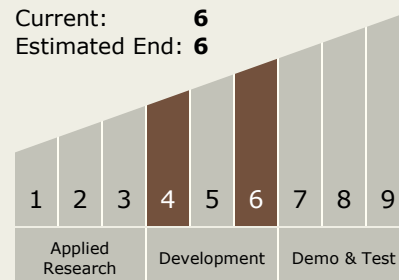
Carlos Torrez

Principal Investigator:

Artur Olszak

Technology Maturity (TRL)

Start: 4
Current: 6
Estimated End: 6

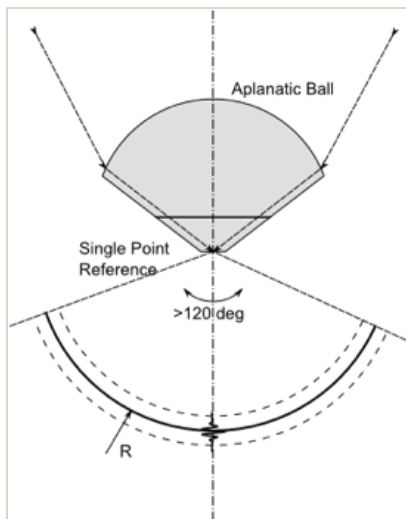


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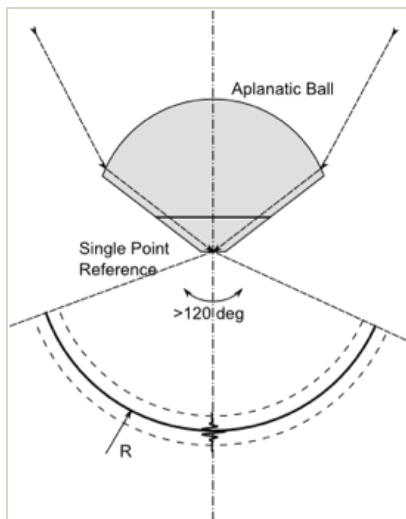


Images



Briefing Chart Image

Low Coherence Wavefront Probe for Nanometer Level Free-Form Metrology, Phase II Briefing Chart Image
(<https://techport.nasa.gov/image/136359>)



Final Summary Chart Image

Low Coherence Wavefront Probe for Nanometer Level Free-Form Metrology, Phase II
(<https://techport.nasa.gov/image/127388>)

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.3 Optical Components

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System